SLOVENSKI STANDARD
SIST EN 50341-2-15:2019

01-december-2019

Nadzemni električni vodi za izmenične napetosti nad 1 kV - 2-15. del: Nacionalna normativna določila (NNA) za Nizozemsko (na podlagi EN 50341-1:2012)

Overhead electrical lines exceeding AC 1 kV - Part 2-15: National Normative Aspects (NNAs) for the Netherlands (based on EN 50341-1:2012)

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ICS:

29.240.20	Daljnovodi	Power transmission and distribution lines

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EUROPEAN STANDARD

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EN 50341-2-15

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English Version

Overhead electrical lines exceeding AC 1 kV - Part 2-15: National Normative Aspects (NNAs) for the Netherlands (based on EN 50341-1:2012)

This European Standard was approved by CENELEC on 2019-05-22.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

1 The Netherlands National Committee (NC) is identified by the following address:

Koninklijk Nederlands Elektrotechnisch Comité (NEC)
Vlinderweg 6,
PO Box 5059
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the Netherlands
Tel.: +31 15 2690 390
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Relevant standards committee: NEC 11/36 “Hoogspanningslijnen en isolatoren”
(Overhead high-voltage lines and insulators)

2 The Netherlands NC has prepared this Part 2-15 of EN 50341, listing the Netherlands National Normative Aspects (NNA), under its sole responsibility, and duly passed it through the CENELEC and CLC/TC 11 procedures. This NNA to EN 50341 has been accepted by the Dutch standards Committee 351001 “Technische Grondslagen voor Bouwconstructies”, responsible for the structural and geotechnical design standards in the Netherlands, as being in accordance with the safety philosophy for structures in the Netherlands.

NOTE: The Netherlands NC also takes sole responsibility for the technically correct co-ordination of this NNA with EN 50341-1. It has performed the necessary checks in the frame of quality assurance/control. However, it is noted that this quality check has been made in the framework of the general responsibility of a standards committee under the national laws/regulations.

This Part 2-15 specifies the values of the Nationally Determined Parameters for use in the Netherlands. Herewith it can be demonstrated that a construction work achieves the level of structural safety as required by Dutch building regulations. This NNA also includes complementary requirements which are non-conflicting with NEN-EN 1990 and the Dutch National Annex to EN 1990. This complementary text may be of normative nature, but also of informative nature (e.g. notes). Also decisions on the application (normative or informative) in the Netherlands of the informative Annexes to the standard itself are specified in the National Annex.

3 This NNA is normative in the Netherlands and informative for other countries.

4 This NNA has to be read in conjunction with Part 1 (EN 50341-1). All clause numbers used in this NNA correspond to those of Part 1. Specific subclauses, which are prefixed “NL”, are to be read as amendments to the relevant text in Part 1. Any necessary clarification regarding the application of NNA in conjunction with Part 1 shall be referred to the Netherlands NC who will, in co-operation with CLC/TC 11, clarify the requirements.
When no reference is made in this NNA to a specific subclause, then Part 1 applies.

5 In the case of “boxed values” defined in Part 1, amended values (if any) which are defined in this NNA shall be taken into account in the Netherlands.

However any boxed value, whether in Part 1 or in this NNA, shall not be amended in the direction of greater risk in a Project Specification.

6 The national Netherlands standards/regulations related to overhead electrical lines exceeding 45 kV (A.C.) are identified/listed in subclauses 2.1/NL.1 and 2.1/NL.2.

NOTE: All national standards referred to in this NNA will be replaced by the relevant European Standards as soon as they become available and are declared by the Netherlands NC to be applicable and thus reported to the secretary of CLC/TC 11.

1 Scope

(ncpt) **NL.1 Application to existing overhead lines**

This NNA is applicable for new high-voltage overhead lines only, not for existing lines in the Netherlands.

NOTE: If some planning/design or modification works on existing lines in the Netherlands has to be performed, the structural integrity shall be assessed based on the following generic building standards:

- NEN 8700 “Assessment of existing structures in case of reconstruction and disapproval – Basic Rules” and
- NEN 8701 “Assessment of existing structures in case of reconstruction and disapproval – Actions

NEN 8700 and NEN 8701 shall be used in conjunction with EN 50341 part 1 and this NNA.

NEN 8700 and NEN 8701 are based on NEN-EN 1990.

EN 50341-1 “Overhead electrical lines exceeding 1 kV” is based on EN 1990.

Where in NEN-EN 1990 and NEN-EN 50341 is referred to 'design' that term should be read in the context of the applying this standard to a review or assessment, by an analysis, as 'verification'. In case of construction re-design this must be understood as referring only to the part of the structure that is subject of the re-design.

(ncpt) **NL.2 Application to cables for telecommunication**

This NNA includes the requirements for application of plastic cables, with metal or without (ADSS) metal, for telecommunication, as well as for conductor/earthwire (groundwire) systems (e.g. wraparound,....).

(ncpt) **NL.3 Application to mounting of telecommunication equipment**

This NNA is applicable for fixing of structural elements for telecommunication (e.g. dishes), if mounted on power line supports (towers), especially regarding the wind forces and ice loads on such fixed elements.

(ncpt) **NL.4 Applicability**

This NNA is applicable to overhead electrical lines exceeding 45 kV (A.C.).

To overhead electrical lines exceeding 1 kV (A.C.) but lower than 45 kV (A.C.) Part 1 is applicable without special national conditions (snc) or national complements (ncpt).

2 Normative references , definitions and symbols

2.1 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments, corrigenda and national annexes) applies.

(ncpt) **NL.1 National normative standards**

NEN-EN 1090-2 *Het vervaardigen van staal- en aluminiumconstructies - Deel 2: Technische eisen voor staalconstructies*
Execution of steel structures and aluminium structures - Part 2: Technical requirements for steel structures

NEN-EN 1990 *Eurocode - Grondslagen van het constructief ontwerp (nationale bijlage)*
Eurocode - Basis of structural design

NEN-EN 1991-1-4 *Eurocode 1: Belastingen op constructies - Deel 1-4: Algemene belastingen – Windbelasting*
Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions

NEN-EN 1991-1-7 *Eurocode 1: Belastingen op constructies -Deel 1-7: Algemene belastingen – Buitengewone belastingen: stootbelastingen en ontploffingen*
Eurocode 1: Actions on structures – Part 1-7: General actions - Accidental actions

NEN-EN 1992-1-1 *Eurocode 2: Ontwerp en berekening van betonconstructies - Deel 1-1: Algemene regels en regels voor gebouwen*
Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings

NEN-EN 1993-1-1 *Eurocode 3: Ontwerp en berekening van staalconstructies - Deel 1-1: Algemene regels en regels voor gebouwen.*
Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings

NEN-EN 1993-1-6 *Eurocode 3: Ontwerp en berekening van staalconstructies - Deel 1-6: Algemene regels - Sterkte en Stabiliteit van Schaalconstructies*
Eurocode 3: Design of steel structures – Part 1-6: General - Strength and Stability of Shell Structures

NEN-EN 1993-1-8 *Eurocode 3: Ontwerp en berekening van staalconstructies - Deel 1-8: Ontwerp en berekening van verbindingen*
Eurocode 3: Design of steel structures - Part 1-8: Design of joints

NEN-EN 1993-1-9 *Eurocode 3: Ontwerp en berekening van staalconstructies - Deel 1-9: Vermoeiing*
Eurocode 3: Design of steel structures -Part 1-9: Fatigue

NEN-EN 1993-1-10 *Eurocode 3: Ontwerp en berekening van staalconstructies – Deel 1-10: Materiaaltaaiheid en eigenschappen in de dikterichting*
Eurocode 3: Design of steel structures – Part 1-10: Material toughness and throughthickness properties

NEN-EN 1993-1-11 *Eurocode 3: Ontwerp en berekening van staalconstructies - Deel 1-11: Ontwerp en berekening van op trek belaste componenten*
Eurocode 3: Design of steel structures - Part 1-11: Design of structures with tension components

NEN-EN 1993-3-1 *Eurocode 3: Ontwerp en berekening van staalconstructies - Deel 3-1: Torens, masten en schoorstenen - Torens en masten*
Eurocode 3: Design of steel structures - Part 3-1: Towers, masts and chimneys – Towers and masts

NEN-EN 1997-1 *Eurocode 7: Geotechnisch ontwerp - Deel 1: Algemene regels*
Eurocode 7: Geotechnical design - Part 1: General rules

NEN-EN 1998-1 *Eurocode 8: Ontwerp en berekening van aardbevingsbestendige constructies – Deel 1: Algemene regels, seismische belastingen en regels voor gebouwen*
Eurocode 8: Design of structures for earthquake resistance - Part 1: General rules, seismic actions and rules for buildings

NEN-EN 1999-1-1 *Eurocode 9: Ontwerp en berekening van aluminium-constructies - Deel 1-1: Algemene regels*
Eurocode 9: Design of aluminium structures - Part 1-1: General structural rules

NEN-EN 50341-1:2013 *Bovengrondse hoogspanningslijnen voor wisselspanning hoger dan 1 kV - Deel 1: Algemene eisen - Gemeenschappelijke specificaties*
Overhead electrical lines exceeding AC 1 kV - Part 1: General equirements – Common specifications

NEN-EN-ISO 14713-2 *Zinken deklagen - Richtlijnen en aanbevelingen voor de bescherming van ijzer en staal in constructies tegen corrosie - Deel 2: Thermisch verzinken*
Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures - Part 2: Hot dip galvanising

NEN 1010 *Elektrische installaties voor laagspanning - Nederlandse implementatie van de HD-IEC 60364-reeks*
Electrical installations for low-voltage - Dutch implementation of the HD-IEC 60364-series

NEN 3011:2015 *Veiligheidskleuren en -tekens in de werkomgeving en in de openbare ruimte*
Safety colours and safety signs in workplaces and in public areas

NEN 3654 *Wederzijdse beïnvloeding van buisleidingen en hoogspanningssystemen*
Mutual influence of pipelines and high-voltage circuits

NPR 9998 *Beoordeling van de constructieve veiligheid van een gebouw bij nieuwbouw, verbouw en afkeuren – Grondslagen voor aardbevingsbelastingen: geïnduceerde aardbevingen*
Assessment of buildings in case of erection, reconstruction and disapproval – Basic rules for seismic actions: induced earthquakes

NEN-EN-IEC 60071-2:2018 *Insulation co-ordination - Part 2: Application guidelines*

NPR-IEC/TS 60479-series *Gevolgen van stroom voor mensen en levende have*
Effects of current on human beings and livestock

NPR-IEC/TS 60815-1 *Selectie en dimensionering van hoogspanningsisolatoren bedoeld voor het gebruik in vervuilde omstandigheden - Deel 1: Definities, informatie en algemene uitgangspunten*
Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 1: Definitions, information and general principles

NPR-IEC/TS 60815-2 *Selectie en dimensionering van hoogspanningsisolatoren bedoeld voor het gebruik in vervuilde omstandigheden - Deel 2: Keramische en glazen isolatoren voor wisselspanning*
Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 2: Ceramic and glass insulators for a.c. systems

NPR-IEC/TS 60815-3 *Selectie en dimensionering van hoogspanningsisolatoren bedoeld voor het gebruik in vervuilde omstandigheden - Deel 3: Polymeerisolatoren voor wisselspanning*
Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for a.c. systems

(ncpt) **NL.2 Informative documents**

API Recommended Practice RP2A-*WSD Planning, Designing, and Constructing Fixed Offshore Platforms—Working Stress Design*

CIGRE-paper 322 *State of the art of conductor galloping*

CUR Aanbeveling 96 *Vezelversterkte kunststoffen in civiele draagconstructies*.
Recommendation 96 FRP *Composite structures*

IRPA/INERC *Guidelines, Interim guidelines of limits of exposure to 50/60 Hz electric and magnetic field*, Health Physics, Vol. 58 No 1, January 1990

2.2 Definitions

(ncpt) **NL.1 Every Day Stress (EDS) loads**
Loads under no wind conditions and 10 °C ambient temperature, without load factors.

2.3 List of symbols

(ncpt) **NL.1**

c_{dir} wind directional factor
c_{prob} reliability factor
D_{max} the sag in each span at maximum conductor temperature
F_{min} the minimum tensile force in the conductor in [N] at the maximum conductor temperature
g_R characteristic ice load on conductors in [N/m]
G_T structural resonance factor for lattice towers
G_{pol} structural resonance factor for steel poles
p_{min} the lowest value of the catenary constant, for which the line has been designed.
$sag_{0°C}$ the biggest midspan sag at 0 °C without wind

$sag_{10°C}$ the biggest midspan sag at 10 °C without wind
w the unit weight of the conductor in [N/m]
γ_{Mf} partial factor fatigue strength

3 Basis of design

3.2 Requirements of overhead lines

3.2.2 Reliability requirements

(ncpt) **NL.1** Consequence Class CC2 according to NEN-EN 1990 has to be used.

NOTE: The reliability level of CC2 is slighly higher than level 3 in Part 1.

(ncpt) **NL.2** For overhead lines with design life of less than 50 years the wind load may be reduced by using the following formula (according to NEN-EN 1991-1-4+A1+C2:2011/NB:2011, clause 4.2):

$c_{prob} = [1 - 0,2 \ln(-\ln(1-1/t))]/[1 - 0,2 \ln(-\ln(1-1/t_{50}))]$

For overhead lines with design life of less than 50 years the ice load may be reduced by using the following formula:

$c_{prob} = [1 + 0,33 (1-a) \ln(t/t_{50})]$

where:

t = the value of the design life in years, but not less than 15 years
t_{50} = 50
a = 0,1 for ice region A
a = 0,28 for ice region B.

(ncpt) **NL.3** For temporary lines a reduced return period of 15 years may be applied. The duration of a temporary line shall be less than 12 months. For wind loads the season coefficient c_{season} is equal to 1,0. The combination of wind and ice loading shall be considered when the temporary line is installed in the months November, December, January, February and March. For temporary lines the standard load cases, clause 4.13, shall be applied.

(ncpt) **NL.4** Specific circumstances at permanent lines are considered temporary when they exist for a period of maximum 1 year. The load factors as mentioned under Special Limit States (table 4.13.b) shall be used.

3.2.4 Safety requirements

(ncpt) **NL.1 Safety measures for supports.**
All supports in an overhead transmission line shall also fulfill the requirements in Annex NA.

NOTE: Annex NA specifies safety measures such as warning signs, climbing facilities and measures to be taken within the structure and in cross-arms.

3.2.6 Additional considerations

(ncpt) **NL.1** In order to reduce the impact of possible failures the maximum distance between tension towers shall not be more than approximately 5.000 m.

3.3 Limit states

3.3.3 Serviceability limit states

(ncpt) **NL.1** In addition to Part 1 it is required that (see Figure 3.3/NL.1):

- the total translation of the top of the supports shall be ≤ 5,5% of the height of the support in case of serviceability limit state loading (see table 4.13/NL.3) and shall be ≤ 1,25% of the height of the support in case of EDS (Every Day Stress);

- the deflection of supports relative to the reference shall be ≤ 0,7% of the height of the support in case of serviceability limit state loading (see table 4.13/NL.2) and shall be ≤ 0,3% of the height of the support in case of EDS (Every Day Stress).

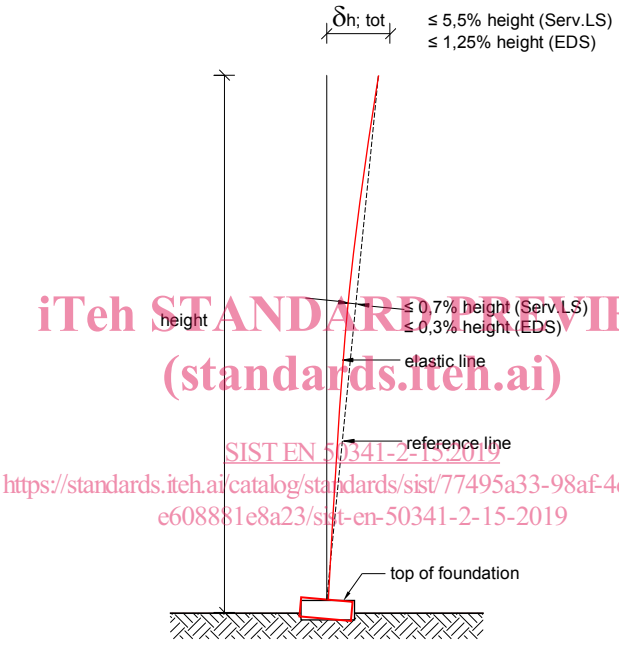

Figure 3.3/NL.1 Maximum permissible deflection of supports